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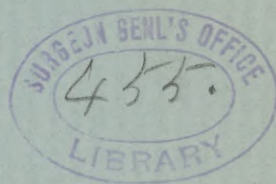
AS RELATED TO THERAPEUTICS.

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presented by Dr. Shurly -



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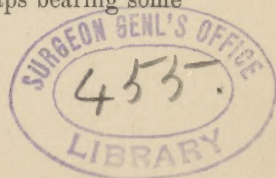
THE TREATMENT OF TUBERCULOSIS AS RELATED TO THERAPEUTICS.

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A PAPER comprising any sort of detailed mention of every plan or article which has been adopted for the treatment of these widespread forms of disease, would amount to a treatise and occupy nearly the whole time of the session of this body. I must, therefore pass without notice many things, and mention in the briefest way possible only such measures as seem to be of particular interest.

Before calling your attention to the subject proper, you will pardon me for stating that I coincide with Dr. Gibbes and others in entertaining a doubt as to the unity of so-called tuberculosis and phthisis pulmonalis, and also as to their specific origin uniformly in the operation of the bacillus tuberculosis. Although the nature of this microbe has been so plainly and definitely unfolded to us by Koch, yet it seems impossible, both from a pathological and clinical standpoint, that such diverse conditions of the body as general or miliary tuberculosis, the several varieties of phthisis pulmonalis, so-called tubercular peritonitis, so-called tubercular bone or joint disease, lupus, leprosy, chronic adenitis, so-called tuberculous kidney, etc., could all arise from either the *incursion*, *development*, or *latency* of a single species of bacillus. Such conclusions are, moreover, not wholly based upon a philosophical comparison of clinical phenomena alone but also substantiated by at least the following facts, deduced from among others: First, that the bacillus is absent oftener than present in acute miliary tuberculosis, in the early stages of acute phthisis pulmonalis or disseminated catarrhal pneumonia, tubercular peritonitis, tubercular disease of joint and bone, and so-called tubercular kidney; and, second, that sputum dried in the sun (thereby having its bacilli destroyed) is capable of producing phthisis pulmonalis. Hence, it would seem reasonable to believe that some other action, of a bio-chemical nature, resulting in the production of a ptomaine, leucomaine, toxin, or toxalbumin (perhaps bearing some



physio-chemical relation to the bacillus), might be accepted as the real disease-process, instead of the action of the bacillus or its spores alone.

However, as it is not within the province of this paper to discuss such points, I will reluctantly desist and invite your attention to a therapeutical classification, somewhat according to Dujardin-Beaumetz and Gilbert, of Geneva, excluding climatic treatment.

GENERAL TREATMENT.—Nutrients, analeptics, gavage, beverages, inoculation, vaccination, hypodermic injection, internal antiseptic medication, enemata, both medicinal and nutritive.

LOCAL TREATMENT.—Medicinal inhalations, inhalations of gases, sprays, powders; external medication, including counter-irritation, cauterization, surgical measures, respiratory gymnastics, and pneumatic differentiation; symptomatic medication.

To avoid prolixity, I will not follow closely the headings just given, but will make conspicuous only certain plans, such as internal antiseptic medication, medicinal inhalations, hypodermic injections, and vaccinations or inoculations.

Assuming the following nosological basis—viz., acute miliary tuberculosis, acute phthisis pulmonalis, sub-acute phthisis pulmonalis, chronic phthisis pulmonalis, and laryngeal phthisis, it will be understood that the plans of treatment to be presented will refer to the latter rather than the two former-mentioned forms of disease, since no line of treatment yet known has been capable of arresting the course of miliary tuberculosis or acute phthisis.

ANTISEPTIC INTERNAL MEDICATION.—The idea of antiseptic treatment is by no means a modern one, for Homer speaks of sulphur as a disinfectant, and the celebrated dissertations of Callisen, Pringle, McBride, Boisseau, Goodwin, and others, were put forth during the years 1767 to 1770, while in 1831 Kaiser published a treatise on the comparative value of the different antiseptics. The modern notion of their use, however, is based upon the micro-biotic origin of disease, and much effort has been put forth in consequence toward perfecting some successful method of treatment, especially since the belief has become rooted that the bacillus tuberculosis is the cause. Among the agents holding a prominent place in the scale of efficacy in this direction may be mentioned, creasote, iodine, iodoform, carbolic acid, creolin, naphthalin, mercuric bichloride and biniodide, turpentine and its derivatives, preparations of arsenic, salicylic acid, boric acid, resorcin, and cupric phosphate. At the

present time, creasote and iodoform probably enjoy the leading reputation.

Creasote has been used in phthisis more or less since its discovery by Reichenbach, in 1833; at first used for hemoptysis only, it is now adopted for systemic treatment. It may be employed alone, or in combination with alcohol, iodoform, carbolic acid, Pearson's solution, or one of the balsams. The remedy has been roundly denounced and highly extolled, according to the varying results obtained in different hands. But this is the fate of every article of the materia medica, not excepting mercury and potassic iodide in syphilis. Much of the discrepancy, however, probably rests with the varying grades of purity of the drug. It is undoubtedly true that with some specimens, when given to certain individuals for a long time, more or less gastro-intestinal disturbance may result. We have found this true of its administration even to monkeys. It is, nevertheless, the best article of its class in use to-day. Iodoform, which is also justly popular, cannot be too long continued in considerable doses without causing anorexia or dyspepsia, if not the peculiar lesion of the liver pointed out by Dr. Gibbes as affecting monkeys which had been kept under its influence.

Iodine has been used for ages in the treatment of all the pulmonary diseases, and much was written in the last century concerning its value in phthisis pulmonalis. Our experiments of late in its use hypodermically have confirmed in the most signal manner the favorable expressions of its action in phthisis which have been from time to time recorded. We have no time to allude to the voluminous literature concerning this therapeutic agent; suffice it to say, that the demonstration of the practicability of its use hypodermically opens up great possibilities for it, when we bear in mind the fact that we can without danger in this manner diffuse through the fluids of the body from one-half to two grains of this potent chemical at a time. Turpentine and its derivatives are highly useful in all forms of phthisis, not only from their selective action in the mucous membrane, but besides from their power over the vascular system through the nerve centres. Salol, the salicylates, and benzoate of sodium are potent remedies in this direction, especially in the acute form of phthisis, often lowering the temperature and producing amelioration when other means fail. Menthol was highly recommended, in 1887, by Rosenberg, and since then has been used by many. It has been variously combined with iodoform, terpine, creasote, and mor-

rhinol, according to the fancy or experience of the observers. It really seems to act efficiently in combination with either morrhinol, iodoform, or creasote, especially during the exacerbations in subacute phthisis, when the whole upper respiratory tract becomes hyperæmic.

MEDICAL INHALATIONS.—Carbonic acid was used as an inhalant about the year 1882, by Drs. Percival, M. Dulont, Hey, Dobson, McBride, John Parkin, and others, all of whom wrote upon the method. The principle of its action, as explained, was the diminution of combustion. A number of favorable results were given by these gentlemen, but Nothnagel and Rossbach wrote unfavorably of such inhalations, believing them dangerous and not useful. There is no doubt of the danger when carelessly used, and for that reason the plan does not commend itself for general adoption. However, I have seen excellent results from such inhalations in cases of obstinate dry cough attended with vomiting in the course of chronic phthisis. Sulphuretted hydrogen has been employed for years in the form of vapor from sulphurous mineral waters, and as sulphuretted hydrogen gas. The only author, however, who points out the danger of these inhalations is Dr. Baron. Catani, Niepce, and Serrand, who have used this process of local medication very much, say nothing of the danger. From our experience with it on animals and man, we have no doubt of its highly poisonous quality. Its effects are sudden, without premonition. The use of sulphurous acid for inhalation is impracticable, owing to its ready conversion into sulphuric acid in the atmosphere. Iodoform and turpentine as inhalants have been used more or less since 1882, brought out and advocated then by Rumno. Sormain proved the absorption of the iodoform in this way by its presence in the urine after inhaling. It is believed to act as an antiseptic as well as an analgesic through the peripheral nerve ends. It may be employed in a cabinet, or inhaled from an atomizer, or, better, either from a Waldenburg apparatus, or by means of compressed air as an insufflation. It is most useful in chronic and laryngeal phthisis.

Benzoate of soda has been used considerably, in the form of a spray, as an inhalant since 1879, when it was brought out by Rokitsansky. The plan of Klebs was to combine its use locally with the internal administration of acids. Such adverse experience was, however, given by Fraenkel, Guttman, Wolf, Senator, Waldenburg, and others, that the plan soon became neglected. I know of no extended experience with it in this country. The inhalation of

aniline oil was recommended by Kremanski, in 1887, in conjunction with the administration internally of acids. He believed that in this way it was possible to produce more or less destruction of the bacilli tuberculosis in the lungs, analogous to its action upon the microbes outside the body.

Hydrofluoric acid has been employed as an inhalant since 1862, Drs. Bastien, Charcot, and Bonchard having been the pioneers in its use. Its employment, however, was never very general until about 1885 and 1886, when Henry Bergen, Garcin, and Dujardin-Beaumetz and Gilbert turned their attention to it. It may be used with a compressed-air inhaler, but its administration is best accomplished by charging the air of a small room or cabinet. When sprayed it should be diluted (equal parts) with water. According to Dujardin-Beaumetz and Chevy, it should be inhaled in the proportion of 1 part acid to 25,000 of air. Some remarkable results credited to this gas have been published in Europe. In this country, however, we have been less fortunate; my own experience with it has been quite unfavorable, the patients in a short time exhibiting signs of decided laryngo-bronchial irritation of a permanent character. It is possible, however, that our facilities for its use may have been too crude. In one case of suspected pulmonary gangrene, I thought the patient did very well under its use for a time.

Peroxide of hydrogen and ozone have produced excellent results in the hands of many. In cases of commencing phthisis (broncho-pneumonia) it is an excellent means of local treatment. Inhalations of hot air by the Weigert system has not fulfilled its promise. Indeed the universal verdict, so far as I know, is against it.

Inhalation of carbolic iodine, menthol and creasote, naphthalin and creolin, have a decidedly beneficial effect in the so-called catarrhal states. The former three are best administered from a hot-water inhaler, while the latter two are more applicable in the form of a spray incorporated with petrolina oil, alboline, or olive oil. Sprays of a solution of mercuric bichloride or biniodide are highly useful in "specific" cases, and in some cases of chronic phthisis. They may be used in proportions of 1 to 2000 or 3000. Carbolic acid as a spray seems rather uncertain. We have derived no lasting beneficial effects from oxygen. Its inhalation, however, in conditions of anæmia, gives excellent effects. Nitrogen has been negative in its action, so far as we could see in a number of cases.

Chlorine gas, which has been used with very encouraging results

by us, was first brought to notice in this way by Gannal, in 1828, who at that time gave some favorable results from its use. It is a very irritating and poisonous gas, and has not found favor for these reasons. We have been persistently experimenting with it for the last two years, more or less, and were unable to make any practicable applications until we began using it in aërial combination with a spray of chloride of sodium, the details of which we have already published. That it will destroy the virulence of sputum there remains no doubt; and used in this way with chloride of sodium it can be borne by the majority of patients. When chlorine water is used we employ an inhaler with an ordinary rubber face-shield, such as dentists use. The chlorine water and salt solution are mixed and then atomized. When not properly used with salt, it is capable of producing catarrhal inflammation of the air-passages.

In many cases of incipient and chronic phthisis much good can be derived from the pneumatic cabinet, which by judicious use will often dilate collapsed lobules, and thus aid the process of nutrition and absorption. Enemata of gases, especially of sulphuretted hydrogen and oxygen, are familiar to all; and although they have fallen into desuetude, yet there are cases which will be greatly benefited by it, such as general tuberculosis with constant cough. It seems to be a good plan to alternate between sulphuretted hydrogen, according to the Bergeron method, and oxygen gas.

Enemata of food, especially food previously digested, is indicated in cases characterized by extreme anorexia without diarrhoea and advanced laryngeal phthisis. This plan will often avert inanition and revive appetite, and may supersede gavage.

INOCULATIONS, HYPODERMIC INJECTIONS, VACCINATION.—The experiences of Gosselin, Raymond, Arthaud, and Tyndall on this subject are very interesting. The inoculation of animals with virus which has been taken after having passed through other animals, or obtained from animals which were affected slightly with tuberculosis, or from the blood of tubercular animals, proved negative as prophylactics. Also, their experiments regarding the preventive action of the salts of mercury and iodoform. But these latter substances, however, administered at the same time as the inoculation, seemed to retard the development of the bacillus without destroying it, and also retarded the development of the disease for a time, constituting the state described by Verneuil as latent microbism: "but after the cessation of treatment the bacilli resumed their activity and the dis-

ease progressed." Iodine, given (not hypodermically) sometimes before the inoculation as a prophylactic, seemed to prevent the evolution of tubercle, but did not destroy the bacillus. Raymond and Arthaud made many experiments in the same line with other substances, among them bisulphide of carbon and tannin. Experiments with the former, hypodermically injected, were found to be negative; while the latter (tannic acid) was thought to be superior to iodoform and other substances in conferring immunity upon rabbits inoculated with tubercle, by the administration of from one to five grammes a day. Subsequently, Gilbert, in administering tannin to cases of phthisis pulmonalis in the first stages, seemed to get some very good results—better than had been obtained by the use of iodoform and bisulphide of carbon, or the salts of mercury. Hypodermic injections of various substances in the last few years have been used in the treatment of tuberculosis. Hypodermic injections of eucalyptol, suggested at first by Dr. Roussel and Dujardin-Beaumetz, and also by Ley, Laplane, Cenas, Balyer, Habert, Bouveart, Pechardre, Biot, and others, have been used without success.

Meunier employed phenol with oil of eucalyptus by hypodermic injection. He also used injections of five per cent. of this mixture with one per cent of iodoform. These injections were apt to produce intoxication, and severe headache and vertigo, with considerable disturbance of the urinary function. Ley, in 1887, proposed the use of carbolic acid with iodine and iodoform. He made the solution with sterilized oil, and injected in doses of from three-tenths to six-tenths centigrammes per day. Durand, after injecting the mixture of eucalyptol oil and iodoform for eight or ten days, alternated with an injection of phenol, with or without iodoform. The salutary action of phenic acid was also extolled by Renzi, who also used iodoform with eucalyptol. The site chosen by him was either the abdomen or between some of the intercostal spaces. Semmola (?) and others have also used, as we know, iodoform internally. They observed that a diminution of fever followed the use of this mixture, but the great trouble was that gastric catarrh was produced in many instances, so that it had to be abandoned. Meunier employed successively eucalyptol, phenol, iodine, and iodoform in solution, using 1 gramme of iodine to 100 grammes of liquid vaseline, giving two injections of 2 grammes a day, after the following manner: The patient was treated with eucalyptol for five days; then five days with phenol; five other days with iodine and phenol; five days with

eucalyptol and iodoform, and then commence the series again. But this plan of treatment was finally abandoned for the lack of good results. We have used in the lower animals for the last two years, by hypodermic injection, not only mixtures similar to these, but a good many chemical substances besides, such as arsenite of sodium, arsenite of potassium, liquor potassæ, permanganate of potassium, iodide of ammonia, carbolic acid, chloride of sodium, arsenite of sodium, sulphate of copper, acetate of copper, chloride of gold and sodium, iodine, glycerin, chloroform, and quinine. The iodoform was used mostly by insufflation and by the mouth, with the undoubted result of arresting the development of the disease in the inoculated animal, but producing, as pointed out by Dr. Gibbes in one of our papers published in the *American Journal of the Medical Sciences*, a peculiar fatty infiltration of the liver, which necessitated its abandonment. These several substances which were used for injection seemed to be incapable of acting as a prophylactic to the animal, or of arresting the development of the disease, excepting iodine and chloride of gold and sodium. Our experiments with these substances, in 1889, showed that they, like others, produced extensive abscesses, resulting in the death of the animal. It was discovered, however, that this was due to the impurity of the chemicals. Upon procuring absolutely pure chemicals and resuming this line of experiment, we found that the tissues would tolerate such injections very well. In guinea-pigs we have injected as much as a grain twice a day of iodine, and up to half a grain a day of the chloride of gold and sodium, without the production of local disturbance, though in some cases, when the injections are put in about the same region for a great many times (inside the thigh of monkeys or guinea-pigs), a superficial ulceration sometimes resulted. This we have noticed particularly in inoculated animals. Whether it is due to the development of the disease locally for a short time, we cannot say. In guinea-pigs and monkeys we find that if injected for from three to six days before inoculation, and the injections continued for two weeks after, that the animal is rendered immune from tubercular infection. Moreover, if monkeys are thoroughly treated hypodermically by these solutions, especially in alternation, they seem to be incapable of acquiring phthisis pulmonalis by the insufflation of dried sputum. We have also been using these substances upon human beings with encouraging results, although we have not had clinical experience enough to definitely decide their true value. We are still engaged in the use, hypo-

dermically, of other chemicals, as well as some of those mentioned, and hope to give our experience to the profession before long. The result in general tuberculosis has not been at all equal to that in phthisis pulmonalis. The general plan of administration is to give first the iodine, beginning with a twenty-fourth or twelfth of a grain, increasing each day to one-sixth, one-half, or even a grain, according to the constitution of the patient. When the symptoms of iodism supervene, we use a solution of chloride of gold and sodium, beginning with one-twentieth of a grain, and gradually increasing to one-fifth or one-third, and continuing for a week or so, then gradually diminishing the doses, and after awhile using two injections a week. For the success of this plan it is absolutely necessary that the chemicals should be pure. The solutions which we use have been made for us by Dr. Clark, Professor of Chemistry in the Detroit College of Medicine. The iodine solution consists of chemically pure iodine, with iodide of potassium, pure water, and glycerin. The gold solution is composed of chloride of gold and sodium (one grain to the drachm), in pure glycerin and water. Great attention must be paid to the hypodermic syringe, which should be washed and rendered antiseptic before and after each injection by alcohol or carbolic acid. Great care must be taken to avoid contamination with any organic particles, which, in the case of the gold solution, readily reduces the gold, rendering it inert. These solutions can be made in ether or oil, but we have obtained better effects from the solutions in glycerin and water. The weaker solutions can be combined if given immediately; but with the stronger solutions there is immediate precipitation of the insoluble iodide of gold, which may cause abscess if introduced under the skin. What the future of this plan of treatment is cannot be determined yet; our aim has been to neutralize by chemicals the *substance*, whatever it is, which keeps up the destructive metabolism.

